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INCREASING FUEL AND POWER REQUIREMENTS OF SWEDISH STEEL INDUSTRY

/Comment: This report presents information on the fuel and power needs of the Swedish iron and steel industry taken from two Stockholm periodicals Fraan Svenska Bruk and Finanstidningen. Fraan Svenska Bruk took its material from three sources: a report by K. G. Ljungdahl, former director of the State Fuel Commission; and statements made by Engineer John Sinter and by Director Sixten Wohlfahrt.

Numbers in parentheses refer to appended sources./7

Report of K. G. Ljungdahl

The following report was made by K. G. Ljungdahl, former director of the State Fuel Commission, to the Swedish Minister of Trade:

An estimate has been made of the probable fuel and power consumption of iron and steel plants for the next 10 years to indicate the trend in this field.

Fuel and power consumption can be expected to rise until 1960 in the following manner: coke and coke dust to 1,070,000 tons, from 366,000 tons in 1948; bituminous coal, peat, wood, and oil to 853,000 bituminous coal tons, from 502,000 tons in 1948; and electrical power to 2,900,000,000 kilowatt-hours, from 1,693,000,000 kilowatt-hours in 1948. The figures for electrical power include 1,680,000,000 and 991 million kilowatt-hours of smelting power, respectively. During the above-mentioned period, only the charcoal consumption is expected to decrease, from 1,363,000 cubic meters in 1948 to 57,000 cubic meters in 1960.

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With regard to the fuel requirement of blast furnaces, a transition from charcoal to coke has long been in progress. Development toward the increased use of coke is continuing steadily. No considerable increase is likely in the use of electrical power for pig-iron production, while in the production of ferroalloys electrical power plays a dominant role. Simultaneously with the increase in Sweden's steel production, the need for ferroalloys will also rise. It is difficult to predict the rate of development, but approximately a two-thirds increase in 10 years seems likely. This means that the ferroalloy industry, in about 1960, should consume approximately 500 million kilowatt-hours and 45,000 tons of coke per year.

At present, the sponge-iron production is developing rapidly with several new projects under way or planned. It is probable that the sponge-iron production will, in 10 years, exceed 100,000 tons annually. About 1960, electrical power consumption for iron production should be close to 100 million kilowatt-hours, and fuel consumption should correspond to approximately 30,000 tons of coke, partly in the form of coke dust and possibly in charcoal.

Manufacture of steel ingots and rather small quantities of steel castings will increase greatly in the near future. Present plans for development indicate an increase of production from 1.3 million tons in 1948 to approximately 2.2 million tons in 1955. Thereafter, the rate of increase will undoubtedly become considerably smaller. If one estimates a maximum of 2.5 million tons for 1960, this would be twice as much as was produced in 1948. Because of the altered distribution among the various manufacturing processes, especially the considerably increased proportion of Bessemer and electrosteel, the fuel and power requirements are not proportionate. If a production figure of one million tons of open-hearth steel is estimated, this would require approximately 300,000 tons of bituminous coal or an equivalent amount of other fuels. For the production of Thomas and Bessemer steel, no further fuel is required. If the production of electrosteel is estimated at one million tons, electric power consumption would amount to 700 million, or possibly 650 million kilowatt-hours. With regard to the refining of ingot steel into finished products in 1960, one must reckon with a nearly doubled fuel consumption, roughly computed at 550,000 tons of bituminous coal. Finally, the electrical power requirements of the iron and steel plants for the processing of steel can be estimated at approximately 1,100,000,000 kilowatt-hours.

Fuel consumption of steelworks, rolling mills, etc., has been computed in terms of bituminous coal. With regard to the furnaces themselves -- open-hearth furnaces and heating furnaces -- the fuel is oil or gas, while bituminous coal as such has a very limited use. Apart from the limited amount of blast-furnace gas, gas is produced from the generators, which use, in the main, coal as primary fuel. Wood and peat are used to a certain extent; under normal conditions, they should, with an increased total consumption, have a relatively smaller significance. The choice, therefore, stands mainly between oil and bituminous coal. This problem is determined almost entirely by the price conditions and the availability of suitable qualities since, in the long run, great technical difficulties are not generally encountered in the transition from one type of fuel to another.

Foreign iron and steel plants produce gas from bituminous coal in large quantities in coke furnaces. The coke thus obtained is used for blast-furnace operations. Hitherto, this method has not been used in Sweden. At present, coke furnaces are found only at the Oxelösund Järnverk where the iron production is limited to pig iron.

Finally, plans have been made for the establishment of a large coking plant in Sweden. In connection with the impending expansion of the communal gas works in Västeraas, consideration has been given to a plan whereby not only the city and its industries, but also industries within a radius of 30-40 kilometers could be wholly or partially supplied with coke and gas.

An investigation of the situation regarding this matter is being conducted jointly by the representatives of the city and several large industries located in the vicinity. The plans envision the use of approximately 200,000 tons of bituminous coal, which would yield 140,000 - 150,000 tons of coke and 30-75 million cubic meters of gas annually. The coking plant would be planned so that it could be enlarged to threefold capacity. The gas would be transmitted in high-pressure pipelines. In this connection, it is indicated that it is entirely natural to combine iron and steel plants with coking plants. Foundries need coke and steel works could use the gas to advantage. The entire Ruhr industrial region is such a combination.

View of Author of Västeraas Plan

According to engineer John Sintor, author of the Västeraas plan, behind which lies the aim of defense preparedness, it is interesting to compare the plan with the considerations which compelled Stora Koppabergs Bergslags AB to desist, for the time being, from the construction of its own coking plant at the site of its large ironworks at Domnarvet, which otherwise would naturally be impending.

Explanation by Director Wohlfahrt

Director Sixten Wohlfahrt has given the following explanation of the difficulties involved in the construction of a coking plant at Domnarvet by Stora Koppabergs Bergslags AB:

This question has always been more or less on the agenda; several investigations have been made with regard to the establishment of a coking plant at Domnarfvets Jernverk. The main reason that a coking plant has not been built is that the management was interested in the construction of an electrically operated coking plant, since Stora Kopparbergs Bergslags AB has adequate access to electrical power. However, no action has yet been taken due to the fact that the method and its economic feasibility are still in an experimental stage. Apart from that, the principal reason is that it is difficult to purchase suitable gas coal for the production of foundry coke, since the coal-producing countries use the best coal for this purpose in their own coke industries. In general, no difficulties have been encountered in the purchase of suitable foundry coke, and by mixing different qualities it was possible to obtain a uniform and economical kind for foundry operations.

Considering the difference in price between coke and bituminous coal, the price of coke has often been so low that the manufacture of coke has hardly been worthwhile. Even during World War II, the management at Domnarvet could buy coke in adequate quality and quantity. After the war, when the availability of scrap iron increased in foreign countries, steel production was based to a greater degree on open hearth steel than on Thomas steel. Since the highly civilized countries have well-developed gas-main systems in their industrial regions, coking operations took place in connection with gas production. This circumstance has resulted in a certain stockpiling of coke, since the open-hearth process has increased at the expense of the Thomas process. From the standpoint of stockpiling, storing of coke is much simpler than storing of bituminous coal, which must necessarily be stockpiled under water or in thin layers. According to experience, coke can be stockpiled as long as desired without being spoiled, and no increase of dust was noticed because of breaking up the coal by freezing.

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The matter of domestic coking plants is still worth considering, according to Ljungdahl. From the viewpoint of preparedness, he said, the most difficult problem is to secure access to suitable bituminous coal for coking.(1)

Of interest in this connection is the fact that the Oxelösund Järnverk has recently put into operation a new coking plant, according to Finanstidningen, which consumes about 460 tons of coal per day as compared to the old one, which required 330 tons of coal per day. The periodical states that the capacity of the new plant is 11,000 tons of coke per month, and that most of this production will be used in the company's own operations.(2)

SOURCES

1. Fraan Svenska Bruk, Vol XXIX, No 1-2, Jan-Feb 51

2. Finanstidningen, Vol XXX, No 24, 14 Jun 52

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